

Warner. Prevention and treatment of tuberculosis.

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Prevention and Outdoor Treatment
of Pulmonary Tuberculosis.

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THE PREVENTION AND OUTDOOR TREATMENT OF PULMONARY TUBERCULOSIS.

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The history of tuberculosis is a story as long as the history of Medicine itself. Great epidemics of contagious and infectious diseases have come and gone. Tuberculosis came to historic light with the dawn of medicine. It has remained, a reflection upon medicine—the greatest scourge to the human race. One-seventh of those dying from all causes die of tuberculosis. When we come to consider what a large number of children who die in infancy of diseases peculiar to childhood, and the long array of diseases which sweep away adults, as well as the army that is carried away by the infirmities due to old age, it is apparent what frightful ravages tuberculosis makes in the ranks of mankind.

The question of its cause and prevention is not a new one. For two thousand years the interrogation of its contagiousness has had many answers in the affirmative. The war of discussion, at times, became intense. Some localities accepting the theory of contagiousness more promptly and thoroughly than others, but all communities possessing its adherents. In Italy, 400 years ago, consumptives were driven into segregation.

All of these debates were, at last, a matter of opinion rather than of scientific fact. For it was not until 1865 that Villeman began his experiments which proved that the sputum taken from a consumptive patient was capable, by inoculation, of infecting guinea pigs and rabbits with tuberculosis. And not until 1882 did Koch demonstrate the principle in this sputum that is capable of transmitting the infection to be the bacilli tuberculosis.

Since this discovery the civilized world has taken new hope. The immediate cause discovered, it was but reasonable to suppose that a sufficient remedy would be found to cure the disease. If failing in that, then to prevent the disease in the near future. Disappointment has been largely the fate. But a hopeful sign that Future will unlock the box containing the coveted secrets of its prevention and its cure, is that all our great nations are working, through its physicians as leaders and the laity as their co-workers, to establish societies for the prevention of tuberculosis, and hospitals and sanatoria for its cure. That the scientific laboratories of the world, with their trained bacteriologists, pathologists and chemists, are seeking the underlying causes, prevention and cure of this disease. Physicians treating these patients in hospitals, or in the home, are to-day giving greater attention to the details associated with its prevention than ever before. Such vigorous effort by so scientific men would make us hopeful that the dawn of a new light is more than a mere dream.

The relation of tuberculosis to civilized communities is an intimate one. The higher the state of civilization, the greater the number of cases of the disease. There is something in the mode of living that contributes

to its production. You do not find tuberculosis among the Indians in their native, open-air mode of life, but it quickly develops when they are brought into civilization's mode of living. Nor is it present among the savages who roam the plain or course upon the mountain plateaus, breathing pure air, untainted, as it is so frequently in our modern homes.

We should think that persons living in the country and in small towns would be particularly free from tuberculosis. Air, sunlight and exercise, are all there in abundance. Yet, many persons living in these places take no pains to have properly ventilated living and sleeping rooms. Many do not seem to grasp the first principle involved in securing proper ventilation.

Again it is certain that many farmers living in a land of plenty, do not always take the time or trouble or patience required in the selection of proper food. But this question, I shall more fully discuss when I come to consider the facts relating to improper diet as a predisposing cause of tuberculosis. In crowded portions of cities, as tenement districts, consumption prevails to an extent beyond the mere percentage of inhabitants. But this is only what we might naturally infer, when we consider how unsanitary many of these surroundings are.

THE INFECTIOUS NATURE OF TUBERCULOSIS.

While Villeman fairly demonstrated in 1865, what had previously been suspected, that tuberculosis could be induced in certain animals by the injection of sputum from a patient suffering from consumption, it was left to Robert Koch to discover and prove that the bacilli tuberculosis were the immediate or exciting cause of the disease. That the sputum of a person suffering from pulmonary tuberculosis usually contains the germs. An important query promptly arose as to whether these germs were the result of the disease or its cause. It did not take long, however, to prove to the world that the bacilli tuberculosis were the cause and not the result of consumption.

If these bacilli are the cause of the disease, and the sputum of consumptive patients contains them in large number the query again arose, and stands pre-eminently before us to-day, as to whether

CONSUMPTION IS A COMMUNICABLE DISEASE.

After Koch's discovery of the bacilli tuberculosis in the sputum of consumptive patients, and that these bacilli by inoculation were capable of infecting guinea pigs with the same disease, it was but natural that the medical profession, in large numbers, began to accept tuberculosis as being a communicable disease from one patient to the other; that it is contagious; that it is with considerable risk that a patient suffering with the disease mingles with others. Many physicians imbibed very extreme notions along these lines. One does not need to read many of our medical journals, nor read them long, to see that there is a tendency among a class of physicians with opposing views, with notions as extreme against its communicability, as the others are for it. But like so many extreme views, it is quite likely that tuberculosis occupies a middle ground in its infective capabilities, and that it is neither as communicable as some physicians would lead us to believe, and a good deal more so than many others believe to-day. That the truth lies between these extreme views.

IS CONSUMPTION A CONTAGIOUS OR INFECTIOUS ONE?

What is contagion, and what is infection? Gould's Dictionary says of contagion, "a process by which a specific disease is communicated between persons either by direct contact or by means of any intermediate agent, also the specific germ or virus which a communicable disease develops." Of infection he says: "The communication of disease germs or virus by any means, direct or indirect."

These definitions are perhaps as good as any given in our dictionaries, and still, I think we conceive a better understanding of contagious diseases and those of an infectious nature, by running over in our mind some diseases which we clearly regard as communicable by contagion and those which simply develop the disease by infection. Yet, strictly speaking, I suppose every disease which is communicable by contagion is a specific infectious disease; but not the converse. Measles and smallpox are highly contagious diseases. They are at the same time infectious; the patient is infected with the germ or virus of these diseases. Malaria and septicæmia are infectious diseases, but not contagious. One who is not immune will probably take smallpox or measles by sitting in a room with a patient suffering with one of these diseases. He will not take malaria nor septicæmia in like manner. The infection must enter in a different way from that.

Now, will consumption infect by mere exposure to the patient, as smallpox and measles does, that is, is it like them, a contagious disease; or does it follow rather the mode of infection as displayed in malarial poisoning and septicæmia, that is, is it simply an infectious disease?

The laws governing the mode of infection of malaria and septicæmia are too well understood for me to repeat them here. I do not believe that anyone thinks it would be possible to contract tuberculosis from a patient if that patient were to step into your office or house so long as he did not cough or expectorate. And even then the sputum would first have to dry before the germs would be liberated to become diffused in the air. In other words, in the absence of the sputum, you might stand in the presence of the patient indefinitely without contracting the disease. Then it is not contagious. But as you can become infected with the disease through the sputum in the manner stated it is a communicable one.

As animals are so easily infected with tuberculosis by injecting these bacilli into them, it seems but reasonable to conclude that they may likewise infect a person and that patient another. Without the direct proof of experimental observation which we have in infecting animals, facts seem to prove clearly the truth of the infectiousness of tuberculosis.

So, we are next confronted with the proposition:

TO WHAT DEGREE IS THIS INFECTION COMMUNICABLE?

With proper antiseptic precautions against the bacilli, there would no longer be fear of the disease. But this would be an ideal condition to think of and try to attain, rather than to hope to attain absolutely. There are so many persons afflicted with tuberculosis who never heard of the bacilli producing the disease. How can they be expected to care for their sputum when they know nothing of the danger associated with the in-

discriminate deposit of sputum in a careless manner? Nor is this practice confined to the ignorant classes by any means. I am sure that it is only thoughtlessness when an educated person, suffering from pulmonary tuberculosis, permits the sputum from a cuspidor to be emptied into a water closet without first destroying these germs contained in the sputum with some antiseptic agent. For, without the use of these antiseptic agents, the sputum with its living germs, enters the streams, and from the streams either find their way into the pipes of a public water supply to the stomachs of those using it, or at least animals depending upon that water supply, and upon which we are dependent for our food supply, drink it, and perhaps become infected to in turn infect those who come to eat of their meat. Whatever may be the final outcome of the discussion of the similarity between bovine and animal tuberculosis, the fact remains that there are very few who believe otherwise than that there is a sufficient similarity to make us guard carefully the health of the animals we eat.

So far as the communicability of the disease is concerned by association with consumptive people, the danger only lies in the careless disposal of the sputum. And then only after the sputum dries and is breathed into the lungs, barring some exceptional cases of the sputum of the infected individual getting into the stomach of one who is not infected; as through the use of the same dishes which have not been sufficiently cleansed and sterilized.

There is nothing to my mind that stamps tuberculosis more clearly as an infectious disease, pure and simple, and not as a contagious one, than the fact that in well regulated hospitals and sanatoria, where the germ is constantly and rationally disinfected, the physician, nurses and attendants do not acquire the disease more frequently than do those in other salubrious walks of life. But we have only to look to some of the old cloisters, where consumption had once secured a foothold, to see the frightful decimation which has been made in their numbers. Notably was this true in some of the cloisters of France where the death rate, says Cornet, reached 62.88 per cent. of those dying from all causes. This was based upon a population of 4,028 people for a period of 25 years. On the other hand at the Brompton Hospital, in London, where all the cases treated are tuberculosis, no greater number of cases of tuberculosis have arisen among the physicians and attendants than in well regulated sanitary communities. This latter circumstance would only seem to indicate that the disease is not strictly a contagious one; that the sputum was so cared for in an antiseptic way as to prevent infecting others. In the former cases, the cloisters of France, the large death rate speaks volumes in favor of the communicability of the infection under conditions that are favorable for the transmission of the infectious germs. I have spoken of this high percentage of death rate in the past tense. I hope the use of the present tense might permit a different statement. But it would seem to emphasize the fact that people may associate with consumptives with impunity, if only the sputum is cared for properly and the general hygienic surroundings are of a high type. If the reverse obtains, we can, in the future, only look for a continuance of the high mortality rate from the disease.

In everyday life, there must be an immense number who breathe into

their lungs the bacilli tuberculosis. Yet a very small per cent. of them become infected with the disease. I presume there is no one reason so accountable for this as

THE RESISTING POWER OF THE INDIVIDUAL.

In just the ratio that the individual forces are lowered, the individual is more likely to acquire pulmonary tuberculosis, or any form of tuberculosis for that matter. But in discussing this question, I have in mind simply one form of the disease, that assaulting the lungs. If diminished resistance is one of the causes which permits a person to become infected with the disease, we should consider well then some of the things that contribute to lessening this power of resistance.

Among those things which contribute to lower one's capacity to resist tuberculosis are:

FIRST, NEGLECTED COLDS:

One may say perhaps that the power of resistance is diminished when a cold implants itself upon the patient. This is unquestionably true when a person takes one cold after the other. But the system's resisting power may not have been below the normal when a cold was first acquired. It may have been wholly the result of carelessness or unavoidable circumstances.

If a person has become greatly overheated and bathed in perspiration, following which he remains in a draft, it does not follow that his resisting power has been diminished. There has simply been a strain put upon one's resisting power that he cannot bear.

One of the functions of a physical laboratory is to test the strain which metals are capable of withstanding. A piece of steel is put into a machine, the force is applied to the steel; at first it resists the strain until the force is applied stronger and stronger, finally the resisting power is at an end, the metal gives way. It may be found that the resistance offered by the steel to the applied force was not only normal, but above it. Still it gave way. Its resisting power was overtaxed.

So it is with the human system in this matter, not alone of taking colds, but in many other ways. The time comes when by reason of one cold after another, the resisting power is not only diminished to prevent the taking of colds but the individual is now in a condition that will more readily permit the infection of tuberculosis finding lodgment in the respiratory tract.

The consequent congestion in the lungs, following these repeated colds, doubtless prepares a more suitable soil for the propagation and growth of the bacilli tuberculosis.

So it clearly suggests itself, that the patient should not only be cured of this cold, but that a vigorous attempt should be promptly made to place that patient's system in such a condition, either by the use of medicine, or by a change of conditions and environments, perhaps both, as will place the patient's resisting power at a high level. Certainly, by this means, many cases of tuberculosis will be avoided.

Closely allied with the taking of cold is the matter of insufficient clothing. It is not always among the poor who are not able to buy it, but quite as frequently among the well-to-do or rich who can well afford the

clothing, but conceive the idea of wearing less than they should. It is true, some people go to the other extreme and load themselves with excessive clothing, which keeps them most of the time bathed in perspiration. They are made tender and susceptible to colds, and these repeated colds soon lower the power of resistance to tuberculosis. A happy medium in the matter of clothing must be found; enough worn to keep warm and prevent sudden chilling of the surface, but not so much as to produce a continual perspiration.

SECOND, VITIATED AIR:

There is probably no one cause that so frequently impairs the health, and consequently the power to resist tuberculosis, as the lack of ample pure air to breathe. It seems strange, indeed, that when air is at the same time so valuable and yet so cheap that it should be regarded so lightly.

This may be the result of one's own fault or the fault of others over whom he exercises no control. If it be one's own fault, it may be the result of ignorance or of carelessness. One may not know that the richness of air in oxygen is quickly exhausted where the air is in a confined space, of course, depending upon the size of that space; but the cubic feet of air space in any of our modern living rooms are not such that its frequent replenishing can be dispensed with.

Instead of ignorance being the basis of breathing air over and over again without replenishing, carelessness or thoughtlessness may be wholly accountable for it.

All educated people know, in a general way, the chemistry of the air and the physiology of the lungs. That the lungs require oxygen to perform their task of oxydizing the blood. That this task is best accomplished when the air contains its normal amount of oxygen. Not only when it contains its normal amount of oxygen, but also when it is largely free from the waste products of combustion represented in air that has been once breathed. If any one stops to reflect, he recognizes at once that the highest standard of resistance cannot be maintained unless the air is maintained in a pure, normal condition. If the air is not kept in a normal condition, how can one expect the health to be maintained and the lungs to offer a normal power of resistance?

To be sure, the length of time during which a person is deprived of pure air is an important element. If the time has been short, it will be insufficient to lower the resisting power. But where it is constant, or at frequent and prolonged intervals, the normal resistance will be quickly impaired.

It is easy to say that sleeping rooms should be large, light and airy, but these are not things that people can always control. But, take the rooms as they are, people could manage the rooms much better than a large percentage of our people do. In the first place, the room should be well aired in the day time. Next, if the room be small, there should be some provision made for replenishing the air during the night, either by communication with a well-aired hall through a transom or door; or by window to the open air. But in securing the air in this way, one must arrange to avoid sleeping in a draught. An open fireplace also makes a good means of ventilation. In summer time, the ventilation of the rooms will take care of itself; for then windows and doors are left open. But

in the fall, winter and spring, it will be necessary to give some thought and attention to these little details.

Again, the air of a room or house is frequently vitiated to an extreme degree by reason of an insufficient vent for the escape of the products of combustion of natural gas. Take many of these asbestos fronts in our grates; you will find nothing more than a mere crevice above for the fumes of the gas to make their escape. Most of them are entirely insufficient to carry off the products of combustion, as a result of which they escape with the heated air, at the top of the grate. It was a great relief to have stepped into one of the hospitals of this city, a few days ago, and find that provision had been made here for using the gas with these asbestos backs. Two inches intervene between the top of the asbestos and the jam, which gives a vent two inches wide and the length of the flue opening. In these grates, you get simply the radiated heat. In those with the mere crevice, the radiated heat and the hot air that overflows above plus the gas fumes accompanying it.

Now the products of combustion vitiate the air and this in turn brings about an excessive and persistent anemia. Even with careful treatment, and after removal of the cause, the anemia is slow in subsiding. The resisting power of the individual has been diminished and continues below par during the time of the convalescence of the anemia.

If there were a smoke associated with the combustion of natural gas, people would at once demand that a sufficient exit be provided for the escape of the gases consumed. But as there is not, this dangerous deception of filling the room with hot air filled with consumed gas continues to an extent that needs correction.

Even still worse are some of the natural gas stoves, where in their use you will find, in many houses, the damper in the pipe turned either completely or to such an extent as to practically prevent the escape of the consumed gas. Even occasionally you will see gas stoves without a pipe at all; simply allowing the fumes to escape into the room. How can persons reasonably expect, living in that manner, to maintain a normal resistance?

THIRD, EMPLOYMENT IN CONFINED SPACES WITH INSUFFICIENT LIGHT AND AIR:

This has been a proposition well understood for many years, and it is to be noted with pleasure that our own architects are continually striving to construct public buildings and workshops along sanitary lines. This has been in part the result of agitation upon the part of health boards and health officers, and in part, also, the result of the labors of the Superintendent of Workshops and Factories. Then, too, capitalists have come to see the necessity of employing educated and skillful engineers and architects to design many of their factories. Many of these show the improvement along sanitary lines over those which have been constructed from a drawing which represented neither knowledge of the best manner of construction, that the owners might receive the best and largest amount of work from their men, nor an insight into the sanitary needs of these men to preserve their health and consequently their power of resistance to pulmonary troubles.

There is still need of greater knowledge along these lines. Especially

is this true of some of our public institutions, where overcrowding is often a necessity.

In many places you find men working, if not in confined spaces, in darkness or semi-darkness. All physicians know that the highest standard of health can no more be maintained by working in these places than a flower can be made to flourish in the absence of ample light.

FOURTH, INSUFFICIENT SLEEP:

As sleep is nature's sweet restorer, so the constant and continuous loss of sleep is a factor in impairing and undermining the health. Sleep in sufficient amounts and regularly secured is an important item in keeping up one's power of resistance.

FIFTH, EXCESSIVE AND CONTINUOUS USE OF ALCOHOLICS:

There is no one fact better understood in medicine than that the excessive and continuous use of whisky or beer greatly weakens one's power of resistance to disease in general and to pulmonary troubles in particular. Such a patient developing pneumonia, not only stands less chance of recovering from the immediate attack, but the lungs are less inclined to clear up, and are made an easy prey to the bacilli tuberculosis. The power of resistance has been brought to a low ebb.

SIXTH, CONGENITAL FEEBLE RESISTANCE, KNOWN AS HEREDITARY TENDENCY:

When Koch made known his discovery of the bacilli tuberculosis, there was immediately a large body of physicians arose to proclaim that "heredity had fallen to the ground." But now, I think, most physicians are inclined to believe that heredity occupies a middle ground between the two extremes, of its never being hereditary, as the new class of thinkers seemed to believe, and its always being hereditary as such a large number had come to believe.

Heredity would seem to occupy the position that many persons are born with feeble resisting power, and consequently they are less able to withstand the onslaught of the exciting causes with the same degree of success that one of a vigorous type will do. It is unnecessary to quote statistics to prove this. And, if some of these statistics were quoted, there is no doubt that many persons who have died in a family, the one after another, it would be found that many of these deaths were the result of infection received by constant association with their invalid relations. So, those with an hereditary tendency may well take new heart. Their resisting power may be increased. Their health cannot be neglected with the same degree of impunity that others neglect theirs. They cannot withstand, equally free from danger, the immediate exciting causes of tuberculosis. There must be unusual care exercised in the selection of occupation, mode of life, and environments of such an individual, if many of the dangers of falling a victim to the disease would be avoided.

SEVENTH, DIET:

A sufficient amount of carefully prepared food is essential to the maintenance of the health in a state that will offer the greatest degree of resistance to the implantation and growth of the infective germs of consumption.

There is a large class, in greater relative numbers in our cities, who cannot always obtain a sufficient quantity of nourishing food to maintain a high degree of strength. But there is another class who pay too little attention to the selection of proper food and the cooking of the same. As a result of this, the nutrition suffers and the strength declines. There is quite as apt to be overeating, when you may look for indigestion, which, if continued, will only result in lessening the resisting power of the individual.

The food should be taken at regular intervals, of a nourishing character, in sufficient quantity, and be properly cooked.

EIGHTH, ENFEEBLED HEALTH FOLLOWING PNEUMONIA AND VARIOUS FEVERS:

// Pneumonia, typhoid fever, malarial fever, measles; indeed any of the fevers lower the resistance and make more likely the development of consumption, if only a decided opportunity has been offered for the germs to gain entrance to the lungs. The soil has been prepared and the bacilli tuberculosis find ready lodgment under the circumstances. This should serve to admonish us that after these diseases the system should be brought up, at once, to as high standard of resistance as is possible. More especially is this true of those who possess already a feeble power of resistance as shown by their ancestry having died of the disease, perhaps, in considerable numbers. They should not be allowed to return as soon to a confining occupation after a pneumonia or typhoid fever, as others can do. Their health and their resisting power should first be fully restored.

NINTH, VARIOUS CAUSES DIMINISHING RESISTANCE:

Anything that tends to lower the vitality diminishes the resistance which an individual may ordinarily offer to tuberculosis. Environment has everything to do with health. To best preserve the health, sanitary laws in general must be obeyed. Many are so situated that they cannot follow these laws, for we must remember that while one may, frequently but not always, be able to follow the laws of personal hygiene, he cannot control always matters of a general character. His environments may be of an insanitary character and yet be unable to control them. Every day that one lives amid such surroundings he contributes to the development of a feeby resisting pulmonary soil that yields more readily to the first decisive exposure to some of the immediate

EXCITING CAUSES OF PULMONARY TUBERCULOSIS.

When the resisting power of the individual is greatly depressed and consequently the soil more suitably prepared for the development of the disease, the bacilli tuberculosis find lodgment in the system and develop a case of tuberculosis. These bacilli usually enter the system through:

1. The lungs.
2. The stomach.

If the entrance be through the lungs, the infection is the direct result of breathing the germs from the sputum of some other patient.

If the entrance be through the stomach, then these germs have emanated:

A. From another individual suffering from the disease.

B. From tuberculous meat or tuberculous milk.

1. If the entrance of these germs has been through the lungs, and that is undoubtedly the usual method of infection, it results in most cases from the careless and indiscriminate spitting in various places. Upon the sidewalks, where it dries and is caught up by the ladies' dresses and dragged into their respective homes; into the streets, where a gust of wind carries the dried sputum mingled with dust, into the mouths of pedestrians; into cuspidors about the home or public places, the sputum drying upon the edges of these vessels, and from there getting into the air of the room to be breathed by those about. How frequently in public buildings we see consumptive patients spitting upon the floor. And herein is the consumptive's crime. It is some such work as that which has made so many people ready to ostracise the consumptive.

As the infective germ lies in the sputum, with suitable care in its disposal, there certainly can be little danger in associating with such an individual. I do not believe this association should be so intimate as to share the same bed. For there are too many instances of a husband contracting this disease from an infected wife, and the converse. During a fit of coughing, the phthisical patient may involuntarily expel some particles of the sputum into the mouth of his associate.

In occupying the same house, the greatest care should be exercised not alone in the disposal of the sputum, but at the same time to giving the freest possible ventilation consistent with comfort.

There is need of the greatest care in the disposal of the sputum of consumptive patients everywhere; but, nowhere is this carelessness more manifest than in some of our sleeping cars. Dr. S. A. Knopf, of New York, following my reading of a paper before the Columbus Academy of Medicine a short time since upon this same subject, in a letter to me, re-emphasizes some of his former observations of the danger, in these cars, of conveying the infection from an infected patient to the one who is not infected. Especially, he well and truly says, that this danger obtains to a greater degree in mid-winter than at other times, and more especially in those through cars bound for Los Angeles or Asheville. With his remedy offered for the relief, the running of ambulance cars, I do not agree. It will be as easy to insist upon the railroad companies caring properly for the sputum of these patients and for our health officials to enforce the order, as it would be to obtain the ambulance cars. If the sputum is properly cared for and disinfected, the danger is removed. That is all you can do with the ambulance cars. But what a difference in the expense! Still better, you have demonstrated to his fellow passengers the manner in which they may associate with their consumptive companion with impunity.

I have no doubt that if the Pullman Company once comes to understand the importance of having the sputum of consumptive travelers, and of all travelers, more carefully looked after by frequent cleansing and disinfecting of the cuspidors, that they would gladly obey rules of health boards along these lines. They would doubtless, too, be willing to sterilize by steam their blankets, after each long trip, if health boards ordered it and popular opinion seemed to demand it.

Is there danger of association with a consumptive patient? No, not

if sanitary precautions are taken. But we all know that there are many more who do not take any precaution whatever than there are who do. Still, the number who are seeking to know what to do to protect their fellow man, and who are exercising these sanitary and hygienic measures are constantly on the increase. It is by this assistance becoming still more general that the hope arises of checking the wild career of this disease.

There is a class of people, however, to whom we cannot look for much assistance. This class live in ignorance, squalor and poverty. If special hospitals for the treatment of tuberculosis were constructed and these people would avail themselves of their care, there would not only be a very less number of foci of infection to contend with, but at the same time they would have been taught many of the sanitary measures to be followed in preventing, not alone the infection of others, but at the same time the re-infection of themselves; so, that those who recover and return to their homes would better understand how to live along sanitary lines.

These special hospitals or sanatoria would not only be of value to this class of patients, and to the community in which they live, indirectly, by lessening the foci of infection, but at the same time to all classes and conditions.

Of the exciting causes, the next method of infection to which I shall invite your attention is:

B. FROM TUBERCULOUS MEAT AND MILK.

That tuberculous meat was one of the modes of infection of the human race, was accepted as a settled proposition until Robert Koch questioned the proposition before the Tuberculosis Congress at London last year. He does not believe that tuberculosis in cattle and the human being are the same. Dr. Koch is practically alone in this position. While he still maintains the same ideas relating to this question, it is interesting to note what he had to say at the meeting just recently closed of the same congress at Berlin. In a report of the proceedings of the meeting published in the "*Revue D'Hygiene*," he said that "he did not doubt that we ought to continue to take precautions to prevent the possible transmission of tuberculosis of animals to man by the milk of cows affected with mammary tuberculosis, but it is necessary, from all the evidence to direct our attention in the future, for the greatest part of our efforts, to the fight against the transmission, infinitely more frequent, of tuberculosis from man to man, and to preserve the greatest sum of our resources and our energy for combating this source of transmission."

At the same meeting, Nocard gave the result of experiments which showed very conclusively that animals may become infected either by the bacilli procured from cattle or man. He reported a series of very interesting experiments, made by himself, illustrating this fact. He fed monkeys, as being more nearly related to man than any of the other animals, on cooked rice, infected with cultures of bacilli tuberculosis, obtained in some cases from cattle and in other cases from man.

To different monkeys, he fed some of the rice infected from the bovine species; the others he fed the rice infected with the bacilli obtained from man suffering with pulmonary tuberculosis. The results are interesting and instructive.

He found that all the monkeys fed in this way developed intestinal tuberculosis. The only difference was that those which were fed bovine tuberculosis cultures developed more quickly and a more severe grade of the disease than those fed with the human tubercular cultures. He has no doubt that if man, instead of the monkey, had been the subject of these experiments that he, too, would have succumbed to the disease.

One of the strongest arguments offered by Koch against the likelihood of tuberculously infected beef and milk being the cause of tuberculosis in man, is the fact that primary intestinal tuberculosis is rare. Nocard admits this, but points out the fact that there is nevertheless a real danger present. More especially he believes this to be true in the case of convalescents from various diseases, whose resisting power is below normal. Their chief aliment is frequently milk, and in this way he believes many patients become infected. Besides, we must not assume that simply because intestinal tuberculosis as a primary disease is infrequent that the patient who has developed tuberculosis in other parts of the body has not acquired it through the food. We must remember that mesenteric and peritoneal tuberculosis often exist without other complications. It is more rational to assume that the infection reached these places through the stomach than the infected lungs.

There has now been collected many cases of butchers who have developed local tuberculosis from wounds received accidentally in dressing tuberculous cattle. Some of these cases have gone on to general tuberculosis. Salmon, in the Journal of the American Medical Association, of December 20, 1902, reports some of these cases.

Still, the consensus of opinion now is that by far the greater number of cases of pulmonary tuberculosis develop as a result of the careless disposition of the sputum of infected individuals.

THE PREVENTION OF THE DISEASE

is then going to be brought about by the correction, in a large measure, of the predisposing and existing causes of the disease. How best to accomplish this is a large problem, but one which I believe will be solved in the not far distant future. There is greater need of the laity understanding more fully the causes leading up to the disease; of physicians taking occasion, more frequently, of acquainting their patients with the causes producing the disease and the means of preventing it.

The Ohio Society for the Prevention of Tuberculosis has been established, and this association of people, not all physicians, will doubtless do considerable in not only diffusing information among the public along preventive lines, but through their strength as an organized body be the means of doing much in the way of establishing sanatoria for its treatment. It seems to me that physicians over the State would do well to help to enlarge this organization by coming into it, as it seems but reasonable to believe that greater good along preventive lines will be accomplished in this way than to fight the disease single handed. "In union there is strength," applies here as forcibly as to other situations.

It seems but reasonable to suppose that, as the various conditions associated with the predisposing and exciting causes becomes more fully understood, the dream of its prevention will become largely realized.

Koch, at the recent Berlin Congress, insists that we should make our greatest efforts along lines that have for their aim the abolishing of the direct and exciting cause. That this main cause he believes to be due to the inhalation of dust containing the bacilli from human tuberculosis. That less effort be expended to search out predisposing causes and more to combating the exciting cause. This proposition he doubtless offers as the final solution of the prevention of the disease.

POSSIBLE PREVENTION OF THE DISEASE THROUGH A FORM OF VACCINATION.

At the close of the recent Berlin Congress, already referred to, a number of the delegates, acting on the invitation of Behring, visited his laboratory at Marbourg, where he, with his two assistants, Doctors Ruppel and Rohmer, have done much during the past year to demonstrate the sameness of bovine and human tuberculosis.

Behring demonstrated to these delegates what had already been affirmed by the experiments of Nocard, of Berlin, and reported to the Congress, that there was a great difference in the virulence of different bacilli tuberculosis.

Behring had inoculated mice with the virulent form of the bacilli; and these little animals promptly succumbed to tuberculosis. With the mild cultures, the animals either did not become infected, or only after many weeks.

He also found that by regulated intravenous injection of human tuberculosis virus into calves, he could render them immune to injection of bovine tuberculosis as virus that was absolutely fatal to the calves which had not thus been immunized. He terms this immunizing, anti-tuberculous Jennerization. He has demonstrated that human tubercular virus in passing through some animals infected by it, as sheep and goats, acquires additional virulence, which is then capable of infecting cattle with uniformity.

While he has succeeded in vaccinating cattle against the disease, of course, it is too soon to know how long this Jennerization, as he terms it, will hold good. And if it continues over a long period to render the bovine species immune, the problem would still remain to be reversed: to successfully vaccinate man against tuberculosis.

Whatever is the final solution of his problems, he has certainly done some of the most important work in tuberculosis since Koch's discovery of the bacillus.

THE OUTDOOR TREATMENT OF CONSUMPTION.

This is not an altogether new form of treatment of the disease, but it is one that has come into considerable favor of late. Especially is this true in sanatoria, where it is adopted as one of the chief forms of treatment. The outdoor treatment is carried on:

1. At home.
2. In tents, usually roughing it.
3. In sanatoria.

FIRST, AT HOME:

At first thought it might seem that the open air treatment might be carried on anywhere with anyone. This is doubtless true if one lives in a place with suitable environments; if he have the means to secure skilled

attention and constant direction. He needs to be informed when and in what manner to live out; whether this outdoor life shall be associated with exercise and its amount. Some days the patient is better off without exercise; other days with it. There is nothing to be gained by a patient's exercising with a greatly elevated temperature and feeble and accelerated pulse. At that time exercise exhausts and does harm.

The food needs to be a subject of constant inquiry and direction.

Carefully selected medicines will form a part of the treatment. Some physicians, in their enthusiasm, have sought to discard medicine and depend upon the open-air treatment alone. But we must not lose sight of the fact that the open-air treatment is not a specific agent for the cure of consumption. It is a valuable therapeutic agent that should not be lightly regarded, but it is not a cure-all. Much valuable aid will still be found in medicines adapted to the case.

It is not always possible to secure the requisite co-operation of the patient with the physician at home. Some people are mortally afraid of air. It is difficult to induce them to seek it in the way it should be sought. It is one of the effects of a tubercular deposit in the lungs to set up a bronchitis. So, that as soon as a bronchitis is aggravated, perhaps by the tubercular deposit, the patient immediately insists that he has taken cold. It is then his belief that the exposure to the outside air is the basis of the bronchitis. From that time on, co-operation is difficult to secure. In this particular class of patients, suffering from tuberculosis, they will do better in sanatoria, where they will receive the encouragement to carry out faithfully the treatment through the example set by the other patients.

Can tubercular patients be treated as well at home with this open-air treatment as by a change of climate? In some seasons of the year they can be, at others not. In the summer, fall and late spring, we have weather, a large part of the time, that is suitable for the outdoor treatment. In the winter there is some of the time that there must be some interruption in the treatment. Much may be accomplished in our own climate by the open air treatment. However, a climate that has a maximum amount of sunshine and a minimum amount of rain and an equable temperature permits a patient to be out of doors more days in the year than where he is in a climate where winters are more or less severe, and at other seasons, rain and cold raw winds driving the patient to cover.

Still, in a climate like our own, we may successfully treat many of our cases at home, and in their homes, by the open air treatment.

SECOND, ROUGHING IT IN TENTS:

Quite a considerable number try this method of treatment in some regions of Colorado, Arizona and California. But for one to try this method of open-air treatment he should not be in a greatly enfeebled condition. He should not be suffering from a considerable elevation of temperature. Roughing it means a large amount of exercise. When one is suffering from a high elevation of temperature he is no more able to endure the fatigues due to the amount of exercise associated with this form of life than one suffering from typhoid fever. This same rule applies to those who go, or are sent by their physician, to those regions possessing a reputation for the cure of tuberculosis, to live in cabins and rough it.

Only in the very early stage, and then when the patient possesses considerable strength, and there is comparative absence of fever, can a patient be consigned to this mode of life with a reasonable degree of hope of benefit or cure.

THIRD, TREATMENT IN SANATORIA:

In England and Germany large numbers of sanatoria have been constructed. These have been built and are operated for the purpose of instituting treatment for consumption by the open-air method. A large number of other countries have followed in the wake of these countries. The United States now has quite a few. As a government, however, it operates but two; one, the army hospital and sanatorium for the treatment of pulmonary tuberculosis, at Fort Bayard, New Mexico, and the other, the United States Marine Hospital Service sanatorium, at Fort Stanton, New Mexico. Both of these sanatoria show good results, that well justify their creation.

Some of the States have established these sanatoria, and in all cases good results have come by reason of their construction and operation.

They are all operated upon much the same lines, but one only has to read the report of the Army and Navy sanatorium to see how they accomplish something. The most rigorous system of hygiene prevails throughout these sanatoria. The sputum is all collected in cups and burnt. It is not permitted a patient to expectorate promiscuously about, to infect others and reinfect himself. The patients are kept in the open air, but have shelter arrangements as necessity requires. Medicines are given as required; exercise is regulated; food supervised with care. The Fort Stanton (Marine) sanatorium reports in the American Medical Association Journal, December, 1902, 24 per cent recoveries. The Fort Bayard (Army) sanatorium in same Journal of November, 1902, shows good results but a lesser per cent of recoveries. Still some of the cases admitted may have been in such an advanced stage as to account for this discrepancy. This sanatorium is doing equally good work with its sister sanatorium of the Marine Hospital Service. Some of the sanatoria show still higher percentage of recoveries.

But we must not expect too much of these sanatoria in general, or of the open air treatment. Judiciously used, it is a valuable aid in our treatment. No doubt some, in their enthusiasm, will go so far as to do harm. But the principle involved seems to be clearly right, that by spending much of his time in the open air, the patient increases his appetite, his weight, his resistance to the disease; while the fresh air and sunlight diminish the virulence of the tuberculous virus. But the sanatoria have another function than the cure of the disease. Their establishment is a wonderful sanitary measure for its prevention. They will draw for their patrons, in large measure, those who are living in unsanitary surroundings; from those who do not understand the means to avoid infecting others and reinfecting themselves.

Ohio should place herself abreast of the times, and establish sanatoria for the treatment, and indirectly the prevention of pulmonary tuberculosis. [Applause.]

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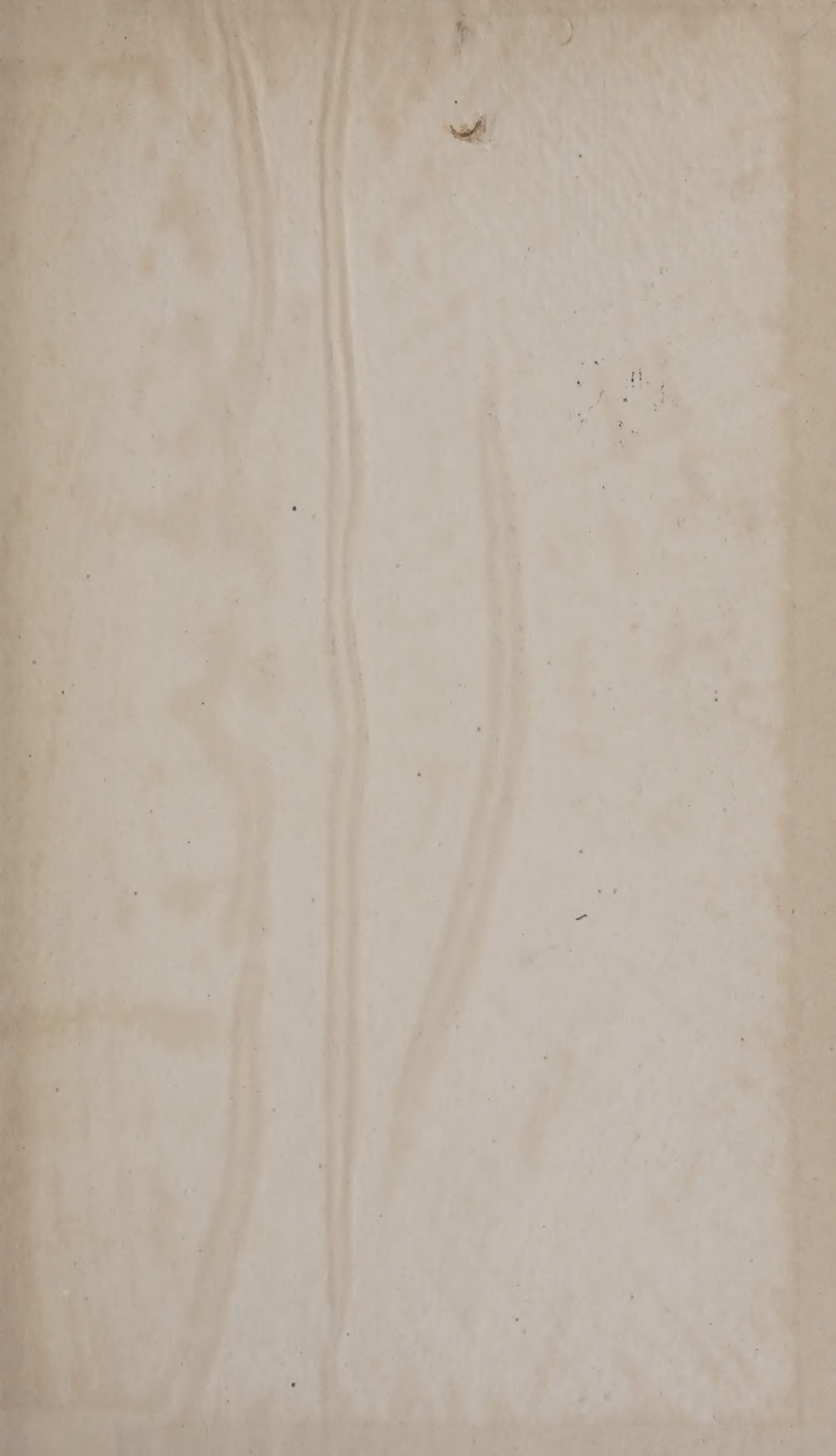
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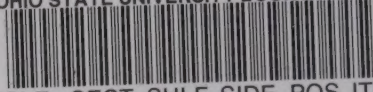
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